(19) World Intellectual Property **Organization**

International Bureau



(43) International Publication Date 30 June 2005 (30.06.2005)

PCT

(10) International Publication Number WO 2005/059590 A1

(51) International Patent Classification⁷:

G01S 15/89

(21) International Application Number:

PCT/IB2004/052540

(22) International Filing Date:

24 November 2004 (24.11.2004)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

60/528,782

11 December 2003 (11.12.2003) US

- (71) Applicant (for all designated States except US): KONIN-KLIJKE PHILIPS ELECTRONICS, N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): LI, Xiang-Ning [US/US]; P.O. Box 3003, Bothell, Washington 98041-3003 (US).
- (74)Common Representative: KONINKLIJKE PHILIPS ELECTRONICS, N.V.; c/o W. Brinton Yorks, Jr. P.O. Box 3003, Bothell, Washington 98041-3003 (US).

- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

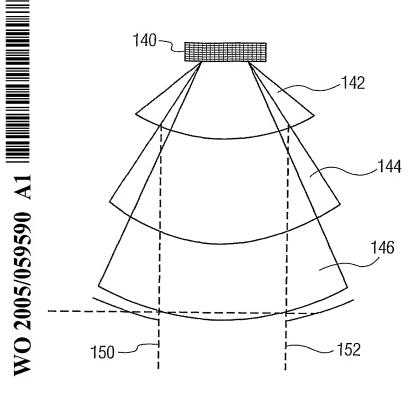
as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designation US

Published:

with international search report

[Continued on next page]

(54) Title: VOLUMETRIC ULTRASOUND IMAGING SYSTEM USING TWO-DIMENSIONAL ARRAY TRANSDUCER



(57) Abstract: Volumetric ultrasound images are obtained using a two-dimensional array transducer to create multiple beams that diverge in a viewing direction to achieve high display resolution real-time volumetric imaging. In one embodiment, ultrasound echoes in a plurality of beams positioned adjacent each other in the elevational direction are projected onto respective planes. The volumetric image is created by combining the planes of projection for all of the beams. As a result, an image having a high resolution can be created in real-time. The area scanned by the transducer is divided into symmetrically arrayed beams so that echoes located at the same distance from the transducer are at substantially the same depth beneath the transducer. In another embodiment, multiple beams scan in respective ranges of scanning depths, and the elevational divergence angle is reduced for deeper ranges of scanning depths. In another embodiment, multiple intersecting or parallel beams are used to create volumetric images.

WO 2005/059590 A1



 before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.